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Ferran's Ideas of Tuberculous Infection.—Ferran believes that certain non-acid-fast bacteria, as a result of a parasitic life, can be transformed into tubercle bacilli. He was able to obtain a homogeneous growth of tubercle bacilli on bouillon, which, after continuous culturing, lost its acid-fastness, and revealed the characteristics of the bacteria of the typhoid-colon group. In guinea pigs these transformed bacteria caused tuberculosis, differing, however, from the typical tuberculosis usually produced in these animals by tubercle bacilli. At the site of infection an inflammatory oedema occurred, which rapidly disappeared, and in a certain proportion of guinea pigs there were individual tubercles. Transfer of these tubercles to normal guinea pigs regularly produces typical tuberculosis. According to Ferran other non-acid-fast bacteria possess the ability to be transformed into acid-fast bacilli and to cause tuberculosis in guinea pigs. The various types of bacilli are grouped by Ferran according to these changes and the difficulty of culturing. The transformation does not occur regularly. Two divisions are also given for pathogenesis, a stage caused by the bacterial toxins, the pretuberculous stage, and the genuine tuberculous disease. Infection occurs as a result of the non-acid-fast bacteria originating mostly from the intestines, which occasion simple inflammatory changes. As the result of the action of the protective mechanism of the body these bacteria are transformed to the genuine tubercle bacillus, and then begins the phase of tubercle formation. For the purpose of immunizing Ferran produces a vaccine by means of the bouillon cultures of the non-acid-fast bacteria, whose tuberculogenic property has been demonstrated by animal inoculation. The vaccine possesses therapeutic value also in other diseases, such as whooping cough, articular rheumatism, etc.—*Die Resultate der Untersuchungen Ferrans über Tuberkulose, Walter, Centralbl. Bakt., Abt. I., Orig., 1924, xciii, 49.*—(*H. J. C.*)

Experimental Tuberculous Reinfection of Rabbit.—In some previously reported experiments rabbits were infected and reinfected by the intratracheal route. The absence of the Koch phenomenon was noted in rabbits first injected in the lung and reinfected subcutaneously; likewise, no allergic phenomenon followed pulmonary reinfection, but extensive caseating lesions, sometimes ending in great cavities, and roughly proportional to the dosage of bacilli. In only one instance was an allergic response noted, that being a generalized splenopneumonia in a rabbit primarily inoculated subcutaneously and secondarily in the lung. These experiments were all done on adult rabbits and with relatively large doses of bacilli. The more recent work was done on the young rabbit. In order to approach as closely as possible the train of events in human beings very small doses of bacilli were employed, from 0.00001 to 0.1 mgm. given intratracheally. Then, four to eight months later, reinfection was practised, also in small doses, by different routes, in order to determine what part these minimal reinfections played in the reactivation or development of pulmonary tuberculosis. *Experiment 1:* Fourteen young rabbits were infected by the intratracheal route with a dose of bacilli varying from 0.00001 to 0.1 mgm. Half of these were kept as controls, the others reinfected, four, five, seven and eight months later, with doses between 0.01 and 0.1 mgm. All were killed between eight and twelve months after their first inoculation. Six of these controls showed no macroscopic pulmonary lesions, the remaining one only a fringe of small tubercles

at the posterior border of one lung. The 7 reinfected animals all showed tuberculous lesions, generally discrete but in two cases quite marked. These results appeared to show that the primary inoculation, if anything, sensitizes rather than protects the lung, and that the secondary infection shows no essential difference in character from the first. It may be questioned whether the lesions resulted from the more recently injected bacilli or from a reactivating effect on bacilli already there as a result of the first infection. It may be noted that some of the control animals (infected only once) received a larger total dosage than some of those twice infected, yet the latter showed lesions where the former did not. *Experiment 2:* It was desired to know whether a pulmonary reinfection superimposed on a childhood infection meets a favorable, unfavorable or modified soil. Four young rabbits were infected intratracheally with doses from 0.00001 to 0.1 mgm., and seven or eight months later the marginal vein of the ear was injected with 0.01 mgm. Killed after one to four months, two rabbits showed no pulmonary lesion, two others only a few discrete nodules at the margin of the lung. No sudden death or violent reaction resulted. Two rabbits reinfected intraperitoneally showed no reaction or lesions. These results are thought to show the independence of the rabbit's tissues and absence of reaction of one focus on another. *Experiment 3:* It was desired to produce the combination of a torpid pulmonary focus and a white swelling, to determine whether the latter played a protective rôle against reinfection or prevented pulmonary lesions from developing. Accordingly, 7 young rabbits received 0.01 mgm. of bacilli by the intratracheal route, and 5 were reinfected directly into the joint four to nine months later with the same dose, 2 others being reinfected by the blood-stream. Three of the 5 which received intraärticular injections developed typical white swellings, and a fourth periarticular lesions, one dying prematurely. The two infected by the blood-stream were traumatized at a joint, and one developed a tuberculous osteitis of the tibia. Also an adult control rabbit, which received one inoculation in the joint showed a tuberculous osteoarthritis. None of the animals showed any allergic phenomena. All those which developed a definite osteoarthritis showed also discrete pulmonary tuberculous lesions. It must be concluded that the secondary articular lesions had no protective effect on the lungs. *General conclusions:* 1. The rabbit's tissues react independently to tuberculous infection. Only subcutaneous localization seems to modify in any way the pulmonary reaction. 2. A local tuberculous focus, in the rabbit, produces no immunity as regards pulmonary tissue infected either before or after. 3. In a given tissue, as the lung, a slight early infection cures itself, but later reinoculation causes lesions which do not appear in controls. This cured childhood tuberculosis, in the rabbit, does not vaccinate the lung and never induces an allergic response.—*Expériences de reinfection tuberculeuse chez le lapin, A. Philibert and F. Cordey, Section d'Études scientifiques de l'Oeuvre de la Tuberculose, November 8, 1924, reported in Rev. d. l. Tuberc., January, 1925, vi, 124.* —(*A. P.*)

Experimental Tuberculous Reinfection of Rabbit.—The first part of this work describes the results of reinfection of adult rabbits with massive doses of human tubercle bacilli, and comprises three groups of experiments designed to determine whether there is any difference in response to reinfection in the rabbit when primary and secondary infections are made in different combinations of tissues. In group one the rabbits received a primary infection of human bacilli intratracheally and 10 cgm. of human bacilli subcutaneously one month later. No Koch phenomenon resulted, only a cold abscess at the side of subcutaneous injection. In the second group 5 rabbits were inoculated subcutaneously with human bacilli and given their reinfecting doses of 1 or 5 cgm. of human bacilli intratracheally. The animals were killed and autopsied twenty-six days after reinfection. The lungs, particularly with the larger reinfecting dose, showed a reaction very different from the controls in which the intratracheal was the first infection. But the reaction was not like that found by Bezançon and de Serbonnes in guinea pig lungs under similar conditions. In the rabbit the lesions are more extensive and diffuse and appear to have less tendency to caseation. On the contrary, the tendency is to hyperplasia ending in massive hypertrophy of the lung. The third group is regarded by the authors as the all important one, since both the primary and reinfecting doses were administered intratracheally. This group is subdivided into three lots according to quantity of bacilli injected. Some animals received two reinfecting doses. Bovine bacilli were used for reinfection in only two rabbits, and the results suggest that the strain of bovine bacilli was of lowered virulence. With relatively large reinfecting doses of human bacilli (5 and 10 cgm.) ulcerating caseous lesions with ultimate

production of large cavities resulted twice in 5 animals. Conclusions drawn from the work with adult rabbits were: *1.* Reinoculation into the skin of the rabbit does not provoke the "phenomenon of Koch." *2.* Subcutaneous reinoculation has no appreciable effect on a primary pulmonary focus. *3.* The reinfection lesion in the lung is quite different from the lung lesion of primary infections. The reinfection lesion is more extensive, more diffuse, generalized and appears to have much less tendency to caseation. *4.* Intratracheal reinfection of a lung already tuberculized intratracheally provokes congestive phenomena which may be very intense, and which are exceptional in the controls. *5.* The lesions of the double intratracheal infection are most often proportional to the total dosage (as much to that of the first infection as to that of reinfection), and may lead to the production of massive caseous areas which soften and produce large cavities. The second portion of the work deals with reinfection of young rabbits with small doses, and comprises three groups of experiments: (1) Both primary infection and reinfection into the lungs. (2) Primary infection of the lungs and secondary infection *via* the blood-stream. (3) Intratracheal primary infection and reinfection into the joints. In the first group it was found that normal rabbits not only tolerated the small doses of human bacilli, even up to one-tenth mgm. but destroyed them, to the extent that 6 of 7 rabbits showed no lesions of any sort as a result of primary infection. On the other hand, 7 young rabbits reinfected intratracheally with small doses of human bacilli from four to nine months after the primary infection with the same dose of human bacilli employed for the controls showed tuberculous lesions. The conclusion is drawn that the first infection, even though healed, has rendered the lung more susceptible. Assuming now the above-mentioned increase of susceptibility, the authors carried out the second group of experiments to determine whether susceptibility is also augmented to reinfection by the blood stream and by the peritoneum. The number of animals employed was too small to draw satisfactory conclusions. The third group of experiments consists of rabbits in which primary infection was intratracheal, and reinfection either into a joint or into the blood-stream in the presence of trauma of the joint. Two animals received the reinfecting dose in the knee-joint four months after a series of intratracheal doses of human bacilli over a period of twenty-one days. A third young rabbit received only one primary infection intratracheally, and its reinfection into the joint nine months later. One control received only the single dose of 0.01 mgm. of human bacilli into the knee-joint. The lesions of reinfection were found to be identically like those of the primary infection. From these animals and two others the conclusions were drawn that there is no allergic joint reaction in the rabbit; that the articular lesion of reinfection is identically like that of primary infection; that the presence of a focus in the lung and in a joint does not produce allergic phenomena in the presence of pulmonary reinfection. In still another series of two rabbits the animals were given their primary infection intratracheally and were reinfected respectively four months and nine months later with 0.01 mgm. of human bacilli into the ear-vein. The knee of the left hind leg was immediately and severely traumatized while a few bacilli were probably still circulating in the blood. One rabbit developed no joint infection, but the second developed a typical white swelling of the traumatized knee. When one considers the relatively small number of bacilli which must have reached the left knee after being filtered through the lungs and distributed to the general circulation one is surprised. Finally the authors conclude that reinfection in the rabbit differs profoundly from that in the guinea pig, that in the rabbit there is no violent reaction of any sort, neither necrotic nor hemorrhagic such as characterizes the phenomenon of Koch in the guinea pig. With the employment of different tissues for both primary and secondary infection, it is only when the first infection is made into the skin and reinfection into the lung that the phenomena of allergy manifest themselves, and then in the sense that reinfection produces a massive extensive lesion, nonhemorrhagic and without tendency to caseation. On the other hand, when infection and reinfection are performed by the same route, intratracheal, the lung instead of being allergic is rendered the more susceptible to the second inoculation, and lesions result which are more extensive and which caseate more rapidly according to the size of dose employed, even to the point of producing large cavities with large reinfecting intratracheal doses. These results appear independent of the interval between primary infection and reinfection and of the age of the animals. A minimal dose, singly or repeated, seems to predispose the lung tissue of the young rabbit to more progressive lesions in the presence of a reinfection.—*Réinfection tuberculeuse expérimentale chez le lapin, A. Philibert and F., Cordey, Ann. d. Méd., January, 1925, xvii, 5.*—(*W. B. S.*)

Experimental Chronic Tuberculosis in Rabbits.—Tubercle bacilli were injected into the tonsils or mucous membranes of the soft palate of the rabbit and were found to produce a chronic tuberculosis closely resembling that seen in the human being.—*A Contribution to the Factors Required for the Establishment of Chronic Tuberculosis, K. Aoyama, Kekkaku, 1924, xiii, no. 4, Abstract from Japan Medical World, 1925, v, 162.*—(*M. M.*)

Effect of Old Tuberculin and Tubercle Bacilli on Experimental Tuberculosis.—Successive injections of large quantities of old tuberculin into tuberculous guinea pigs inhibited, more or less, the generalization of the disease. Ulcer formation at the site of inoculation was more marked than in control animals. When tuberculin sediment, obtained by precipitation with ammonium sulphate, and alcohol-soluble substances in tuberculin, digested by pancreatin to remove the substance producing the tuberculin reaction, were used as vaccine, the formation of the local ulcer was inhibited, as were also the generalization of the tuberculosis and the destructive action (necrosis and caseation) of the tubercle bacillus on the tissues. Very small amounts of tuberculin, successively injected, can accelerate the generalization of the tuberculosis, and the cell-destructive action in the lymph nodes. The sediment from glycerin bouillon after ammonium sulphate treatment, digested and injected, did not inhibit the generalization of tuberculosis. From these experiments it is assumed that there are two substances in tuberculin, one which hinders the generalization of tuberculosis and the destructive action of tubercle bacilli on the tissues, and the other which accelerates the tuberculosis. The active substance responsible for the tuberculin reaction appears to accelerate the disease when continually used. This substance can be removed by digestion with pancreatin. When three types of digested pancreatin vaccines of the tuberculin sediment are obtained, one by the addition of ammonium sulphate, the second the alcohol-insoluble substance, and the third the alcohol-soluble substance, and compared with one another, the alcohol-soluble substance exhibits the strongest inhibitory action on experimental tuberculosis; the ammonium sulphate sediment is next; and the alcohol sediment produces the least effect. An alcohol extract of powdered tubercle bacilli has an inhibitory action on the generalization of tuberculosis and on the tissue-destructive action of the tubercle bacilli, the alcohol-ether soluble substance having a similar action, but the alcohol-insoluble, ether-soluble substance, which exists in larger quantities in the tubercle bacilli has no such action. The digested alcohol-soluble substance of old tuberculin does not act as an antigen for complement fixation, either with the serum of the tuberculous patient or with that from an immunized rabbit. The alcohol-soluble substance of old tuberculin digested with pancreatin had a remarkable inhibitory effect on the progress of experimental tuberculosis in guinea pigs, and the serum of test animals thus treated contained the least amount of complement-fixing antibodies for tubercle bacilli (Mueller's Antigen).—*Influences of Some Components of Old Tuberculin and Tubercle Bacillus on the Progress of Experimental Tuberculosis, K. Yoshizawa, Japan Medical World, 1924, iv, 283.*—(*M. M.*)

Rate of Dissemination of Tubercle Bacilli in Normal and Immune Guinea Pigs.—In a previous investigation it has been shown that the dissemination of tubercle bacilli is extraordinarily facile and rapid in the normal and, accordingly, non-allergic and nonimmune guinea pig given a first infection. In the present article this investigation has been continued in two studies, one having to do with the rate of dissemination of tubercle bacilli from the periphery to the interior in immune guinea pigs, and the other with the early mobilization of bacilli from the portal of entry in both normal and immune guinea pigs. In the first study the animals were immunized with a strain of low virulence, R1, and later inoculated with a heavy suspension of H37, a virulent strain of tubercle bacilli. Beginning three days after this inoculation, and continuing at frequent intervals, reinoculation, of the tracheobronchial lymph nodes, lungs, spleen and regional iliac lymph nodes was done. In the second study guinea pigs were infected intracutaneously with H37, and the areas of inoculation excised at hourly intervals from one to six hours thereafter. The subsequent appearance or absence of tuberculosis was noted. Experiments were also done to determine the rapidity with which the bacillus reaches the regional lymph nodes following intradermal inoculation of nonimmune animals. Both these tests were repeated on animals immunized with R1. The results obtained were as follows: *1.* In normal nonimmune guinea pigs tubercle bacilli, inoculated intracutaneously or subcutaneously, are carried almost immediately (within an hour) from the portal of entry by the lymphatics. *2.* Within three or four days they have made the circuit of the body. *3.* In immune animals their transmission is greatly re-

tarded. *4.* They remain fixed at or near the portal of entry for about seven days. *5.* They do not reach the regional lymph nodes until two weeks after infection. *6.* They do not become generalized throughout the body until three or four weeks after infection.—*The Rate of Dissemination of Virulent Tubercle Bacilli in Normal and Immune Guinea Pigs, A. K. Krause and H. S. Willis, Tubercle, June, 1925, vi, 438.—(J. S. W.)*

Autoreinfection of Tuberculous Guinea Pigs.—Reinfection of a tuberculous guinea pig with pus from its own lymph nodes causes a tuberculous nodule as in a healthy guinea pig, but reinfection with pus from another animal generally causes no such phenomenon. In other words the tuberculous guinea pig possesses a very complete immunity to superinfection with heterogenous bacilli, but very incomplete to its own bacilli.—*Autoreinfection du cobaye tuberculeux, J. Paraf, Meeting, Soc. de Biologie de Paris, March 7, 1925, reported in Presse Méd., March 14, 1925, no. 21, 335.—(E. H. K.)*

Effect of Exudate from Allergic Tuberculous Peritonitis.—Fluid of allergic peritonitis was obtained by injecting a large dose of tubercle bacilli into the peritoneum of a tuberculous guinea pig. This fluid was filtered to free it from bacilli. When injected with this filtrate healthy animals often develop a local scar and react to tuberculin for two or three months. Although nontuberculous they resist inoculation with virulent bacilli during this period.—*Etude biologique de liquide de péritonitis allergique du cobaye tuberculeux, J. Paraf, Meeting, Soc. de Biologie de Paris, March 7, 1925, reported in Presse Méd., March 14, 1925, no. 21, 335.—(E. H. K.)*

Production of Allergy by Fluid from Tuberculous Guinea Pigs.—Living tuberculous guinea pigs were perfused, and the perfusing fluid was filtered. The injection of this fluid into healthy guinea pigs made them allergic. The work of McJunkin with filtered peritoneal exudate from guinea pigs which had been given injections of large doses of tubercle bacilli intraperitoneally in a similar manner is cited. The positive findings are explained on the basis that the perfusion fluid in passing through the tuberculous organs removed in small amount some of the specific antigen present, which thus sensitized the normal guinea pig.—*Erzeugung einer Allergie bei nichttuberkulösen Meerschweinchen durch tuberkelbacillenfreie Flüssigkeit, W. Nitschke, Ztschr. f. Hyg., 1924, cii, 587.—(H. J. C.)*

Influence of Thyroidectomy on Tuberculosis.—Varying effects occurred after thyroidectomy in animals affected with tuberculosis, but on the whole the thyroidectomized animal suffered more rapid progress of the tuberculosis than did the nonthyroidectomized animal.—*On the Influence of Thyroidectomy against Tuberculosis, R. Kawakami, Kekkaku, 1925, vol. iii, no. 1, Abstract from Japan Medical World, 1925, v, 227.—(M. M.)*

Experimental Tuberculosis of Adrenals in Guinea Pigs.—In the guinea pig the production of tuberculosis in the adrenals has been considered impossible, and the pathological changes reported have differed from those found in human cases. The initial parenchymal changes, however, have been reproduced, with secondary connective tissue growth. The proliferation of the connective tissues does not arise from the blood capillaries but from the stroma in a manner similar to that seen by the author in human cases.—*On the Pathological Changes of the Suprarenal Capsules of the Guinea Pig in Experimental Tuberculosis, W. Kiyokawa, Igaku Chuo Zasshi, 1925, vol. xxii, no. 23, Abstract from Japan Medical World, 1925, v, 217.—(M. M.)*

Experimental Tuberculosis of Adrenals in Guinea Pigs.—After a brief review of the literature the results of guinea pig experiments are recorded. In no case were there changes in pigmentation found in the skin nor was there an increase or decrease of pigment determinable in the adrenals. A diminished blood-pressure was the only positive finding in the experiments.—*Über das Krankheitsbild der Nebennierentuberkulose beim Meerschweinchen, Y. Sumiyoshi, Ztschr. f. Tuberk., 1924, xl, 254.—(H. J. C.)*

Scurvy and Tuberculosis.—Experiments were performed on tuberculous guinea pigs given a diet in which the antiscorbutic vitamine C was lacking. Healthy control animals fed this diet for 4 weeks showed upon section the typical picture of scorbutus. Weakened tuberculous guinea pigs with a chronic disease died on this diet within 5 to 9 days, without the tuberculosis changing in character. The tuberculous animals showed a marked susceptibility to the lack of vitamine C. An increase in the oxygen consumption was not noticed in the animals thus nourished. No disturbance in immunity was found. The sensitivity in the skin to tuberculin was diminished and sometimes became negative. A uniform explanation for these findings is not given.—

Tuberkulose und Ernährung, I. Mitt., R. Bieling, Ztschr. f. Hyg., 1924, ci, 442.—(H. J. C.)

Scurvy and Tuberculosis.—Tuberculous guinea pigs during early infection reacted to a scorbutus-producing diet exactly like normal animals. Further in the course of tuberculous infection the animal becomes susceptible to this type of diet and dies earlier than noninfected scorbutic animals. In man scorbutus does not definitely activate tuberculosis. A marked scorbutus in chronic tuberculosis can have a fatal effect.—*Tuberkulose und Ernährung, II. Mitt., R. Bieling, Ztschr. f. Hyg., 1924, cii, 568.—(H. J. C.)*

Influence of Vitamines on Tuberculosis in Guinea Pigs.—Tuberculous guinea pigs were given vitamine, as addition to their food, in the form of lemon juice and cod-liver oil. The codliver-oil feeding was not well tolerated even by nontuberculous guinea pigs. The addition of 10 to 25 cc. of lemon juice daily favorably influenced the course of tuberculosis in the guinea pig.—*Tuberkulose und Ernährung, I. Mitt. Der Ablauf der Tuberkulose des Meerschweinchens bei Darreichung von akzessorischen Nährstoffen, B. Leichtentritt, Ztschr. f. Hyg., 1924, cii, 388.—(H. J. C.)*

Influence of Scurvy on Allergy to Tuberculosis.—To determine the influence of vitamines upon the resistance of the tuberculous organism, guinea pigs were fed vitamine C-free food (hay, clover, water and milk) produced by heating the food one hour in flowing steam. After 3 weeks the typical manifestations of scorbutus developed. Aside from the ordinarily fed control guinea pigs, a part of the vitamine-free nourished animals, a short time prior to or coincident with the vitamine-free feeding, were infected by the intraperitoneal injection of 0.05 mgm. human tubercle bacilli, so that with the development of scorbutus tuberculosis could be expected. With the appearance of the first signs of scorbutus all the animals were tested intracutaneously with 0.02 gm. of old tuberculin. While the nontuberculous gave a negative reaction, the normally nourished tuberculous animals gave a definite positive cutaneous reaction which began to disappear after 48 hours. The scorbutic tuberculous animals on the contrary revealed a weak reaction which had disappeared by the second day, indicating a definite diminution of the reaction ability of these animals to the tuberculin. Noteworthy is the fact that the noninfected and the infected scorbutic animals did not react like the normally nourished nontuberculous and tuberculous animals with an increase but with a drop in body temperature which was even greater in the nontuberculous animals.—*Tuberkulinreaktion und C-Vitamin, F. Schilf, Centralbl. f. Bakt., Abt. I, Orig., 1924, xci, 512.—(H. J. C.)*

Production of Immunity to Tuberculosis in Animals.—Numerous have been the attempts to produce immunity to, or to cure tuberculosis in laboratory animals. Very few have been the successes reported, and those few apparently favorable results usually lack any subsequent confirmation or disproof. The reader is left with a single experiment, often of small extent and inadequately described, as a verification of the particular therapeutic theory. A brief review of the experimental work of the last twenty years along these lines is given with comment on the general lack of confirmation of many of the results. Also the possibility of a spurious protection having been obtained in some instances by the tubercle vaccine not being absolutely dead is pointed out, for it is known that a living inoculum is capable of inhibiting a superimposed infection. The importance of multiplying the evidence where attention has been drawn to a new remedy is mentioned, and with this especially in view an experiment was carried out along the lines of the one reported by Dreyer. One batch of 18 guinea pigs was inoculated with human tubercle bacilli ("Lyons") of medium virulence, and another batch of 18 received an attenuated bovine strain, (H 159 (b)), the infecting dose being 0.1 mgm. administered subcutaneously in each instance. Five weeks later treatment of one-half of each batch with Dreyer's diaplyte vaccine was instituted. This was made from a six weeks' old glycerine-broth culture, and required only one repetition of the extraction with formalin and acetone to obtain complete defatting. The dosage, based on that used by Dreyer, varied from 0.5 to 1 cc., and was given at intervals of from one to four weeks. The animals tolerated the inoculations well, as shown by the daily weight curves. No fall in weight could be attributed to the treatment, and throughout the experiment the weight curves of the treated and untreated guinea pigs ran very similar courses. At post-mortem similar lesions were seen in both the treated and the untreated. Of the group infected with human bacilli the treated lived an average of ninety-nine days each, while the untreated averaged one hundred and thirteen days. The bovine infected group averaged one hundred and forty-seven days for the treated and two hundred and one days for the untreated. *Conclu-*

sions: From the evidence presented, the diaplyte vaccine used exerted no favorable influence when employed curatively and in the dose recommended on the course of tuberculosis in guinea pigs.—*Prophylaxis and Therapy in Animal Tuberculosis, H. Schutze, Lancet, March 7, 1925, ccviii, 488.—(J. S. W.)*

Clinical Significance of Tuberculin Hypersensitiveness.—The grade of tuberculin skin sensitiveness to the intracutaneous injection of old tuberculin was studied in healthy children, suspects, those with pulmonary tuberculosis and with bone and lymph-node tuberculosis. The results are elaborately tabulated and lead to the following general conclusions: In bone and lymph-node tuberculosis there were especially high skin-sensitive values found. In opposition to the findings of Erlandsen and Petersen, the healthy, and to a less degree the suspects, showed greater allergy than those with pulmonary tuberculosis, while the end-stages quite regularly exhibited anergy of the skin. Aside from this, the grade of tuberculin sensitiveness and the type, extent and course of the disease showed no correlation. For instance, it was questionable whether anergy in the third stage of pulmonary tuberculosis was of favorable or unfavorable import. The relation of tuberculin sensitiveness to fever, the age of the process and the nutritional condition also could not be determined. The value of tuberculin as a practical indicator for the differentiation of different disease processes or as a prognostic agent is entirely negatived.—*Beziehung der Tuberkulinempfindlichkeit zu spezifischen und unspezifischen Faktoren, E. Lange, Ztschr. f. Tuberk., 1924, xl, 241.—(H. J, C.)*

Skin Sensitiveness Due to Tuberculin and Vaccinia Combined.—The work of Prudden and Hodenpyl has shown that the introduction of even dead tubercle bacilli may not be without evil consequences. The vaccination of tuberculin-negative children with a mixture of tuberculin and smallpox vaccine resulted in a tuberculin sensitiveness within three to four weeks after the vaccination, while the injection of tuberculin alone produced no such sensitiveness. As at present performed, the skin sensitiveness produced by this means is transient. Alcoholic organ extracts and lipoids, which in themselves have no antibody-forming capacity, acquire such a capacity if brought into contact with an extract of protein of another origin, and it may be that this is what occurs with the tuberculin when brought into contact with the smallpox vaccine. Will the mixture of ordinary sera, peptone solutions, etc., with tuberculin accomplish the same "activating" results? This method should not be used as a clinical procedure until much more study is done upon the question.—*Tuberkulöse Hautallergie nach intrakutanen Simultanimpfung von Tuberkulin und Kuhpockenlymphe, E. Moro and W. Keller, Deutsche med. Wchnschr., June 19, 1925, li, 1015.—(H. S. W.)*

Tuberculin Hypersensitiveness and Immunity to Tuberculosis.—It has been claimed that dead tubercle bacilli mixed with smallpox vaccine, and used in children, is an immunizing agent against both smallpox and tuberculosis. But such a position is untenable. If one would advance such an idea, it is incumbent upon him to prove that injection of dead tubercle bacilli does actually produce a real and lasting sensitiveness, and that the child is protected against subsequent infection with the tubercle bacillus. In animal experiment it has been shown that an immunity may exist without evidence of tuberculin sensitiveness, although we can recognize tuberculin sensitiveness only in the presence of tuberculous infection. Tuberculin sensitiveness must be a subordinate phenomenon, and certainly the intensity of the tuberculin reaction is not a measure of the degree of immunity nor is it an index of prognosis. The evidence for the setting up of immunity in guinea pigs by the inoculation of dead bacilli is neither large nor convincing, the claims all being based on experience with only a very few animals. On the other hand, many well-controlled experiments show that not only does inoculation with dead tubercle bacilli not produce an immunity, but that no procedure that we know of will establish immunity to tuberculosis except infection with living tubercle bacilli. This is the only rational means of immunizing against the disease, namely, inoculation of living tubercle bacilli in such doses and of such virulence that will not produce the disease in the subject in whom immunity is being set up.—*Bedeutet Tuberkulinempfindlichkeit Tuberkuloseschutz? H. Selter, Deutsche med. Wchnschr., June 5, 1925, li, 933.—(H. S. W.)*

Local Hypersensitiveness Produced by Tuberculin.—The use of the ophthalmic reaction to tuberculin first called attention to the fact that the application of tuberculin to a given tissue may render that tissue relatively more sensitive to subsequent application. In this work the author sets out to corroborate certain observations of Pirquet, and to determine further as to the extent to

which the above fact applies to other forms of the tuberculin test. The skin-reaction of Pirquet was employed, as being the test most frequently used. In each case there was a first test, followed later by a retesting of the same spot, and a simultaneous control test performed at a corresponding point on new skin. As a rule the three tests were performed in doubles, to serve as a check. Reinjections of the same skin area were made, both when the primary reaction was positive and when it was negative. Reactions were studied as to variations in rapidity of development, size, intensity, glandular reactions and the rare occurrence of a general reaction. The following general conclusions were drawn: in studying conditions of anergy by successive Pirquet tests the reinjection of a skin area previously injected may lead to error, regardless of whether the earlier reaction was positive or negative, or the patient allergic or anergic at the moment of reinjection. "Homotopical" reinjections give an inaccurate picture of the sensitiveness of the individual: the local sensitiveness produced by tuberculin renders subsequent tests of the same skin area too prompt, too large and too intense, and may even, in certain cases of anergy, render them unduly positive. At the same time, however, it would seem that reinjection of a previously injected site, or "homotopical" reinjection, may now and then give interesting information. A negative reaction obtained at the site of an earlier positive skin reaction appears to indicate an especially intense anergy.—*Recherches sur la sensibilisation locale engendrée par la tuberculine. La répétition homéotopique de la cuti-réaction, cause d'erreur dans l'étude des anergies, M. Weiss, Ann. de méd., April, 1925, xvii, 408.*—(*W. B. S.*)

Hypersensitive Tests with Watery Extracts of Tubercle Bacilli.—Living tubercle bacilli were digested with sterile distilled water at 25° to 37°C. for several weeks. This extract in 4 cc. amounts killed tuberculous guinea pigs, and in man 0.1 to 0.4 cc. produced cutaneous and general reactions. These extracts in anaphylaxis tests, by the Schultz-Dale method on the intestine of tuberculous guinea pigs, proved specific in every case when human-bacillus extract was used in the preparation from the guinea pigs infected with human bacilli, while the human-bacillus preparation with bovine cultures was specific in 30 per cent only. Repeated subcutaneous injections with this material into normal guinea pigs sensitized the intestine of these animals.—*Überempfindlichkeitsversuche mit wässerigen Extrakten aus Tuberkelbacillen nach der Schultz-Daleschen Methode, C. Schilling and H. Hackenthal, Ztschr. f. Hyg., 1924, cii, 417.*—(*H. J. C.*)

Action of Extracts of Tubercle Bacilli.—The Schultz-Dale preparation was made use of in testing the action of various tubercle-bacillus preparations. Watery extracts of living tubercle bacilli caused contraction in the Schultz-Dale preparation from tuberculous guinea pigs. Extracts of human tubercle bacilli cause a contraction of the intestine of guinea pigs infected with human bacilli only, thus making it possible to differentiate the human and bovine types by this method. The intestines of tuberculous guinea pigs on which a cutaneous test had been previously made were not influenced by these extracts, while the subcutaneous injection of old tuberculin did not abolish the reaction with the intestine preparation.—*Eine spezifische Reaktion bei der Tuberkulose des Meerschweinchens, C. Schilling, Centralbl. Bakt., Abt. I., Orig., 1924, xciii, 72.*—(*H. J. C.*)

Allergy from Dead Tubercle Bacilli.—After repeated subcutaneous or intravenous injections of dead tubercle bacilli guinea pigs revealed typical intracutaneous tuberculin reactions 250 days after injection, even though section revealed no specific focus or tuberculous tissue at this time. It is believed, therefore, that the cutaneous tuberculin reaction does not definitely indicate the presence of living bacilli, and is not necessarily associated with the presence of tuberculous tissues—*Über die cutane Tuberkulinüberempfindlichkeit gesunder Meerschweinchen nach subcutaner oder intravenöser Vorbehandlung mit abgetöteten Tuberkelbacillen, J. Nakayana, Zeitschr. Hyg., 1924, cii, 581.*—(*H. J. C.*)

Immunization and Susceptibility to Tuberculosis.—When 0.000,001 to 0.1 mgm. of tubercle bacilli was injected subcutaneously into a guinea pig or a naturally immune animal there developed no foci at the injection site, but it is believed that the injected bacilli really proliferated *in situ*. When, however, infection developed, the injected bacilli not only proliferated vigorously but invaded other tissues. These facts indicate that in the first case the animals had acquired a local immunity to the injected bacilli, while in the latter the local protective power had been overcome by the invaded bacilli. It is also believed the total sterilization of the invading bacilli is not necessary for the production of immunization. Tests were also made of the susceptibility of the animals to dead and

living bacilli as well as the effect of pregnancy, disease of the various viscera, etc.—*Experimental Studies on the Immunization and Infection of Tuberculosis, J. Takenchi, Kekkaku, 1924, xiii, no. 3, Abstract from Japan Medical World, 1925, v, 162.*—(*M. M.*)

Allergy and Immunity from Dead and Cold-Blooded Tubercle Bacilli.—The dispute regarding the action of dead or cold-blood tubercle bacilli in producing the allergic condition in animals has not been definitely settled, and for the purpose of investigation the authors used old tuberculin, and "tuberculins" prepared from turtle bacilli and milk bacilli. In the preliminary treatment of their animals, human tubercle bacilli and turtle and milk bacilli were used. The material was utilized unheated and heated for 10 minutes (individual strains up to one hour at 60°). As a control, physiological salt solution was used. The tests were made on nontuberculous children and guinea pigs, and showed that a tuberculin allergy, as indicated by tissue changes, could not be brought about by preliminary treatment with dead or cold-blood tubercle bacilli or other acid-fast saprophytes. Allergy is considered identical with tuberculosis immunity. It was further found that animals given a preliminary treatment with dead human bacilli and living Friedmann bacilli never revealed even the slightest immunity to reinfection. The skin reactions in these animals are rather nonspecific reactions to bacterial proteins.—*Ist eine der tuberkulösen Allergie entsprechende Gewebsumstimmung durch Vorbehandlung mit abgetöteten Tuberkelbacillen oder Kaltblüter-Tuberkelbacillen möglich? H. Selter and Geschke, Ztschr. f. Hyg., 1924, cii, 303.*—(*H. J. C.*)

Immunity to Tuberculosis from Dead Tubercle Bacilli.—Previous infection will not protect against reinfection with tubercle bacilli, although it will modify the course of the latter. Older children in tuberculous families, if they develop the disease, have a much more chronic type than do children of the same age in nontuberculous families. Animals injected with dead tubercle bacilli give typical Koch phenomena reactions when inoculated with living bacilli, but the reactions are mild. These animals after infection outlive normal animals or animals already infected with tubercle bacilli. The protection is in some way linked up with hypersensitiveness. Children inoculated with young but dead tubercle bacilli develop hypersensitiveness. Intracutaneous injections of dead tubercle bacilli were done in 27 children in a closed institution where every care was had to prevent natural infection. The children were negative to tuberculin tests before the injection of the product. At three weeks after the injections all the children remained negative. At six weeks 6 were positive: at three months after the injections, tuberculin tests were done on 20 with the result that 7 were strongly positive, with zone of reaction greater than 1.5 cm.; 5 were positive with a reaction area of at least 1 cm.; in 3, weak reactions; and in 5, no reactions were present. Other children were injected subcutaneously or intramuscularly with this preparation. Such a method of immunization is much more rational and much safer than the use of living virulent tubercle bacilli, which have been used by certain investigators.—*Weitere Beiträge zum Problem der Tuberkuloseschutzimpfung mit abgetöteten Tuberkelbazillen, H. Sanger, Deutsche med. Wchnschr., March 27, 1925, li, 513.*—(*H. S. W.*)

Immunization with Dead Tubercle Bacilli.—Anaphylactic sensitiveness to tubercle-bacillus protein may manifest itself as a tuberculin skin reaction in addition to the regular reaction. Also, animals may at times show a specific tuberculin response to intracutaneous injections of tuberculin, when they have had no tuberculous infection, but have had only nonspecific treatment with other bacteria than tubercle bacilli. The use in animals of Lange's dead tubercle bacilli vaccine produces no allergy. It does not appear to produce any immunity to subsequent tuberculous infection.—*Nachprüfung des Langerschen Verfahrens zur Tuberkuloseschutzimpfung im Tierversach, E. Seligmann and F. v. Gutfield, Deutsche med. Wchnschr., June 26, 1925, li, 1064.*—(*H. S. W.*)

Allergy from Dead Tubercle Bacilli.—No investigation of allergic or immune reactions, where other material than living tubercle bacilli are used for sensitization, are complete unless they show that certain phenomena observed by Koch and his disciples may be duplicated in animals sensitized with such material. An attempt was made to repeat with guinea pigs sensitized by dead tubercle bacilli the various allergic phenomena which in the past have been observed in animals previously infected with living tubercle bacilli. Throughout the experiments reported the bacilli were killed by heating never less than one hour at 100°C. in a water bath and the hydrogen-ion concentration of the suspensions used for inoculation was always about 6.8. The guinea pigs used for these experiments weighed from 350 to 400 gm.,

as the weight of the animal has been found to be a most important factor in the creation of a definite allergic state. The usual procedure was to give 3 injections of dead bacilli intraperitoneally every three or four days, with the total amount averaging 7.5 mgm. Practically all the sensitized guinea pigs gave a definite intracutaneous reaction to 5 per cent old tuberculin in two weeks. Killed tubercle bacilli, whether inoculated subcutaneously or intraperitoneally, were found always to produce tubercles in the peritoneum. Attempts were made to avoid such tubercle formation by the use of the nucleoprotein fractions of Zinsser. Also chemically treated bacilli (brominized) were tried, but whole tubercle bacilli were found to be the best antigen for sensitization. The intracutaneous skin test, intraperitoneal tuberculin reaction, Pfeiffer's phenomenon and Koch's intracutaneous phenomenon were studied with the use of animals previously sensitized with heat-killed tubercle bacilli. All animals sensitized with such bacilli were previously healthy and failed to react to 5 per cent old tuberculin. In studying these allergic reactions, two types of controls were used: one of tuberculous and the other of perfectly healthy animals. This was done to see whether the animal sensitized with dead bacilli in any way varied from the infected animal. The question of the immunizing value of the dead bacilli is not discussed. The eye, the pleura and the testes of guinea pigs were also studied as indicators or sites of the allergic state. In the eye the allergic reaction is seen to much better advantage than in the skin or in concealed organs like the testes. The pleura experiment was an attempt to repeat Paterson's findings that pleurisy with effusion is an allergic phenomenon and the work on the testes was done to see whether the type of reaction obtained by Long in guinea pigs actually infected with tubercle bacilli could be secured in animals sensitized with dead bacilli. In this second part of the experimental study only a few tuberculous animals were used for correlation controls. The larger number were animals sensitized with killed tubercle bacilli. Although the series consisted of small numbers of animals, the difference was so striking that there was no doubt as to their correct interpretation. The authors conclude (1) that guinea pigs sensitized with dead tubercle bacilli give an allergic reaction which in its essentials does not vary from that observed in infected animals, and (2) that the severity of the reaction depends upon the degree of the hypersensitiveness. Complete tables accompany this article.—*Immunological Studies in Tuberculosis, III, Concerning Allergic Reactions Obtained in Animals Sensitized with Killed Tubercle Bacilli, S. A. Petroff and F. W. Stewart, J. Immunol., July, 1925, x, 677.—(J. S. W.)*

Action of Tuberculin.—The fact that from old tuberculin and tubercle bacilli numerous chemical substances have been prepared that can elicit a characteristic tuberculin reaction in the body, as well as the determination that various indifferent substances, for example, silicic acid, kaolin, aluminum hydroxide, etc., possess the power to remove the tuberculin-like principle, seemed to indicate that these are not different tuberculins but rather that these substances isolated from tuberculin are more or less the neutral carriers of one and the same active and easily absorbable agent, namely the genuine tuberculin. In so far as the individual tuberculin preparations differ in their action this is to be attributed to the various admixtures present. It was possible to prepare a highly active dialyzable tuberculin substance, soluble in alcohol, and giving none of the protein reactions (biuret and ninhydrin). In distinction to the ordinary market tuberculins, which occasion by their content of protein, vascular and uterine contraction in the healthy body, the purified tuberculin preparation does not cause these nonspecific reactions in the normal animal body, but only acts upon the organs of tuberculous individuals. A reaction could be obtained with normal tissues provided there was a tuberculous focus in the animal. The tuberculous tissue is, therefore, not the only carrier of the substance capable of causing a reaction, but rather the tuberculous focus sensitizes the other healthy tissues of the body. Investigations disclose further that the active principle of tuberculin is no bacterial fraction, nor is it a protein, nor an albumose, nor a polypeptid-like body, nor a proteose or otherwise biuret-reacting protein or its split-product. The action of tuberculin resembles, in a general way, the symptoms occasioned by nonspecific irritants, but specifically the tuberculin action differs in that with very small doses the changes are found only in an animal which has become allergic through tuberculous infection.—*Untersuchungen über das Wesen des Tuberkulins, R. Bieling, Centralbl. f. Bakt., Abt. I., Orig., 1924, xciii, 56 and 73.—(H. J. C.)*

Tuberculin Reaction.—Is this reaction an antigen-antibody phenomenon? It has been shown that when tuberculin is mixed with serum from mild tuberculosis, the reaction from the resulting mixture when used to test the skin is weakened, as though there

were sufficient antibodies in the blood of the patient, who was doing well with his tuberculosis, to neutralize the potency of the tuberculin. Serum from those with severer degrees of tuberculosis failed to neutralize the tuberculin. Repetition of this work failed to confirm these claims. Other claims, that exposure of tuberculin to serum from the tuberculous for as long as twenty-four hours fortifies the tuberculin, were also tested, and it was found in general that the intensity of the reaction after the mixture is 24 hours old is greater, but, whatever change may have resulted might well be attributed to changes in the albumin and not at all to the tuberculin.—*Ist die Tuberkulin Reaktion eine Antigen-Antikörperreaktion? H. Moral and S. Sarbadhikary, Deutsche med. Wchnschr., October 10, 1924, li, 1408.*—(*H. S. W.*)

Theory of Tuberculin Action.—Animals injected with dead tubercle bacilli or with products of tubercle bacilli will give quantitatively small but nevertheless definite reactions to tuberculin. Bacilli enclosed in celloidin bags will cause a diffusion of sensitizing material and thus establish allergy in the animal. This may or may not be lost after removal of the bag. But the bacilli in most of these experiments escape, and the animals die of tuberculosis. Lately others have proved that treatment with dead bacilli will establish an allergy to tuberculin.—*Zur Theorie der Tuberkulinwirkung, Rieckenberg, Deutsche med. Wchnschr., January 23, 1925, li, 147.*—(*H. S. W.*)

Action of Formaldehyde and Heat on Old Tuberculin.—Crude tuberculin with formaldehyde added and heated at 38°C. for several days gradually loses its power to provoke a skin reaction. The two factors, heat and formaldehyde, are necessary to bring this about. At 70° the power to provoke skin reaction diminishes more rapidly.—*Action de la formaldéhyde et de la chaleur sur la tuberculin brute, Bacveyron, Meeting, Soc. de Biologie de Paris, April 4, 1925, reported in Presse Méd., April 11, 1925, no. 29, 471.*—(*E. H. K.*)

Influence of Serum on Tuberculin Reaction.—The earlier observations of Pickert and Löwenstein on the ability of tuberculous sera to weaken tuberculin, and in rare cases increase its action, were repeated. This neutralization phenomenon was verified by a number of other authors. Jadassohn found, however, that normal human serum could under certain circumstances enhance the action of tuberculin. This could not be verified. The neutralization phenomenon was studied on healthy and tuberculous guinea pigs and rabbits. In more than half of the healthy rabbits the neutralization of the tuberculin occurred. In the remainder there was no effect. In no case was there an enhanced action. In tuberculous rabbits, in about half there was an equal reaction and in the remainder a decreased reaction. The serum of healthy guinea pigs had a slight weakening effect, but in no case was there an enhancement. The serum observations in tuberculous guinea pigs were very complicated. The controls gave in most cases a positive reaction. The reaction was dependent upon the allergy of the test individual, and did not parallel the intensity of the old tuberculin skin reaction. A definite answer to the question as to whether the weakening or enhancing effect of various sera was specific or nonspecific could not be definitely given. The enhancing action of the serum of tuberculous guinea pigs was in a certain sense considered specific, while the action of the serum of healthy guinea pigs and rabbits was viewed as nonspecific.—*Studien zum Tuberkulinproblem. 3. Mitt. Zur Frage der Beeinflussung des Tuberkulins durch verschiedene Sera, A. V. Frisch and E. Silberstern, Beitr. z. Klin. d. Tuberk., 1924, lviii, 266.*—(*H. J. C.*)

Influence of Serum on Tuberculin Reaction.—There are substances in the serum of the tuberculous person that indicate activity. When serum from such persons is mixed with tuberculin, and the mixture is allowed to stand for twenty-four hours, the tuberculin effect is sometimes altered. But differences are not sufficient to warrant attaching significance to them, since the sera in certain individuals with tuberculosis may act quite differently from that in other individuals who also have tuberculosis. When "serum residue" is mixed with tuberculin the effect of the resulting product on sensitive skin is no different from that of the mixture of the serum with tuberculin.—*Über Beeinflussung der Tuberkulinintrakutanreaktion durch Serum, R. Treu, Klin. Wchnschr., March 5, 1925, iv, 450.*—(*H. S. W.*)

Influence of Serum on Tuberculin Reaction.—Serum from the tuberculous tends to neutralize or lessen the potency of tuberculin in eliciting the skin reaction if the serum is mixed with tuberculin beforehand.—*Über Beeinflussung der Tuberkulinreaktion durch Serum, A. V. Frisch, Klin. Wchnschr., May 14, 1925, iv, 977.*—(*H. S. W.*)

Influence of Serum on Tuberculin.—No influence on tuberculin could be shown when serum from the tuberculous, either moderate or advanced cases, was mixed with tuberculin.—*Über die Beeinflussung der intrakutanen Tuberkulinreaktion durch das Blutserum Augentuberkulöser, M. Schlegel, Deutsche med. Wchnschr., October 17, 1924, li, 1446.*—(*H. S. W.*)

Fate of Tuberculin in Rabbits.—In elaboration of studies by Peyrer, Selter and others, the fate of tuberculin in the blood of rabbits and its neutralization was studied. After the intravenous injection of 1 cc. of tuberculin, blood was drawn at definite intervals and the serum was tested by intracutaneous injection in an allergic tuberculous animals. It was found that tuberculin could not be determined in the blood after 24 hours, and the disappearance is gradual. After 2 hours the concentration was 1:100 to 1:1000, and after 4 hours 1:10,000.—*Studien zum Tuberkulinproblem. I. Mitt. Über das Verhalten des Tuberkulins im Kaninchenorganismus, A. V. Frisch and E. Klimesch, Beitr. z. Klin. d. Tuberk., 1924, lviii, 261.*—(*H. J. C.*)

Fate of Tuberculin in Rabbits.—The disappearance of tuberculin from the blood of a tuberculous rabbit was studied. Selter and Tancré studied the disappearance of tuberculin in a tuberculous guinea pig and found that it differed from the healthy guinea pig. The rabbits were infected in the iris and it was found that tuberculin disappeared more rapidly from the tuberculous rabbits than from healthy rabbits. The excretion of tuberculin in the urine of healthy and tuberculous rabbits was tested by means of intracutaneous injection into tuberculous guinea pigs. The first 3-hour periods gave positive reactions.—*Studien zum Tuberkulinproblem. 2. Mitt. Das Verhalten von Tuberkulin im Kaninchenorganismus, A. V. Frisch and E. Silberstern, Beitr. z. Klin. d. Tuberk., 1924, lviii, 264.*—(*H. J. C.*)

Tuberculin Reaction and Water Balance.—The water balance in tuberculosis, and especially the influence of the diuresis following tuberculin injections, was studied. The protein picture of the blood following the tuberculin injection, with consideration of the general and fever reaction, and the relation of the blood protein to the water content were correlated. The following conclusion was drawn: Tuberculin calls forth a focal reaction, which results in an increased cellular destruction and a flooding of fibrinogen into the blood. This occasions an increase in the osmotic pressure in the blood, which increases the water-binding power of the blood, and results in a diminished diuresis. If the cellular destruction now ceases and the fibrinogen is broken up into higher dispersed fractions, the osmotic pressure drops, and water is freed and is excreted by the kidney, resulting in an increased excretion of urine.—*Studien zum Tuberkulinproblem. 4. Mitt. Tuberkulinreaktion und Wasserhaushalt, A. V. Frisch and J. Braun, Beitr. z. Klin. d. Tuberk., 1924, lviii, 272.*—(*H. J. C.*)

Specific Substances in Alcoholic Extract of Tubercle Bacilli.—There is very little known about the chemical nature of the substances with antigenic properties in the alcohol and ether extracts of the tubercle bacillus, and of similar substances in the extracts of the acid-fast saprophytes and the diphtheria bacillus. In the experimental work described an attempt was made to observe the following points: (1) the extraction of specific substances from the tubercle bacillus; (2) to obtain preparations with maximal potency starting from different extracts; and (3) to acquire certain information about the chemical composition of the preparations obtained. Microchemical methods were used for the determination of the P and N content of the preparations. The potency of the preparations as antigens was determined by means of the complement-fixation test, using always the same very potent rabbit serum obtained by injecting the rabbit with the emulsion of the same tubercle-bacillus strain as used in the preparation of extracts. In a table are given the different amounts extracted with the successive use of different lipoid solvents from 131 gm. of tubercle bacilli, and the effectiveness of the extracts as antigens in the complement-fixation test. With the separation of the ether and alcohol-soluble and acetone-insoluble fractions of the extracts, and in several cases with washing them with water, preparations were obtained from all ex-extracts examined (5 ether, 1 ethyl and 1 alcohol extract), which were active as antigens very closely in the same amount, 0.0002 to 0.0003 mgm. being the antigen unit. Continued purification did not result in increasing the potency of the preparations. Chemical examination of the purified products, as far as it was done, showed them to be closely similar to each other. Carbohydrates were present in large amounts in the nonpurified alcohol extracts, and from 12 to 26 per cent of them were found in the preparations obtained from both the alcohol and ether extracts in different phases of the purification process. The amount of

carbohydrates in the most effective preparations and their eventual connection with the specific properties of the preparations has not yet been determined. The purified product has a chemical composition widely different from the well-studied phosphatids. The very high potency of the preparations, the close uniformity of the potency, and chemical compositions of the preparations obtained from different extracts made it probable that the preparations obtained consist largely of the specific substance.—*On the Specific Substances in the Alcohol Extract of the Bacillus of Tuberculosis, L. Dienes and E. W. Schoenheit, J. Immunol., May, 1925, x, 631.*—*(J. S. W.)*

Serum Lipase in Pulmonary Tuberculosis.—The investigation for serum lipase in tuberculosis and other infectious diseases revealed diminished values, and showed that there is no parallel between the lipolytic power of the serum and immunity as determined by means of the tributyrin method. The findings of Kollert and Frisch that all cases of cachexia with pulmonary tuberculosis have low lipase titres was corroborated, while cases in good general condition showed a normal or only slightly reduced value. It is believed that there is a close relationship between the lipolytic power of the serum and the cachexia. This was borne out by the low values found in other cachectic conditions.—*Über die Bedeutung der Serumlipase bei der Lungentuberkulose, E. Henschke and H. Zwerg, Beitr. z. klin. d. Tuberk., 1924, lviii, 324.*—*(H. J. C.)*

Psychology and Mental Troubles of Tuberculous.—To be able to speak in a personal way of the psychology of the tuberculous, one must have observed them in society at the beginning of their illness, as well as in the family, sanatorium, or hospital. *Tuberculosis and the psychoses:* Tuberculosis may play a rôle in the psychoses, either by the local action of the disease on the meninges and brain, or by the intermediation of an intoxication. Although acute tuberculous meningitis is well known, the localized form, "en plaques," is less familiar. This form may give rise to hemiplegia, aphasia, or acute delirium. There are also slowly evolving forms simulating cerebral tumor. In considering the rôle of toxemia it must be recalled that fever in itself causes mental troubles, as does also anorexia which may be associated with active tuberculosis. There is also a form of diffuse encephalitis ending in sclerosis. There are also mental troubles which seem to depend on modified or disturbed function of the endocrine glands, especially the thyroid and suprarenals. There may be either a destruction or an excitation of function. Poude has shown that the tuberculosis toxins may stimulate the interstitial cells of the testicle and ovary, causing an exaggerated development of the sex characters. It is also possible for tuberculosis toxins circulating in the maternal blood to affect these same functions in the fetus. *Symptomatology of tuberculous psychoses;* The most common forms are mental confusion and delirium. There are also erotomanias and delusions of persecution. To be sure that the psychosis is dependent on the tuberculosis there must be a correlation in development although, on the other hand, it is held that a latent tuberculosis may underlie certain psychoses. The hereditary neuropathic constitution without doubt strongly predisposes to such reactions. But careful observation, such as those of Chantemesse, often reveal mental disturbances premonitory of tuberculous meningitis, such as general weakening of the intelligence, moral or affective perversions, and bizarre conduct. These things also have a medicolegal aspect. *Antisocial reactions in the tuberculous:* These patients often manifest aggressive reactions toward those surrounding them and caring for them, and malignant accusations may be made by erotomaniacs and those with ideas of persecution. Sexual delinquents are common among the tuberculous, and such acts as contamination of water by spitting are not infrequent. *Psychology of the tuberculous:* Letulle, studying especially tuberculous young people, notes that the beginning of the malady is often signalized by a functional nervous excitation; that there is a flowering of psychic qualities, in strange contrast to the stationary or decreasing stage of the physical forces; that there is a real intellectual hyperexcitability, the patient making many projects, and often even realizing them, but above all giving the impression of being furiously pressed to live. Of this hyperexcitability the patient may be unconscious or only partly conscious. At a later date the patients are either filled with illusions, or are discouraged and depressed. The excitation then gives way to lassitude of the intelligence. Their memories are still faithful and precise, but the recollections evoked are apt to be sad ones. Judgment and reason are now employed chiefly defending their rights, and they make apparently paradoxical decisions which, however, are based on the maxim, "a short life but a gay one." The vast majority of the tuberculous remain fully conscious of their condition, and the famous terminal euphoria is rare unless they are morphinized. Beside

the intellectual state the spiritual or affective side is deserving of study. At first, paralleling the intellectual erethism, there is an irritability or irascibility, or better susceptibility. The predominating mood is one of sadness. There is also an exaggerated egoism which no other disease seems to bring out to the same degree. The patient wants the satisfaction of his desires without considering the consequence, and jealousy is unfortunately common, even leading to crime. On the other hand, these patients are very sensitive to impressions, such as natural surroundings, and this may partly explain the benefit from certain climates. To sum up, the three most common mental characteristics of the tuberculous are lassitude, egoism, and exaggerated sensitiveness. To intelligently minister to such patients an understanding of this is essential. It has been debated much whether the tuberculous show an exaggerated sexuality, a consuming desire. Careful observation and testimony seem to show that there do exist veritable *embrasês* by virtue of their tuberculosis. This is explained, not so much on physical as psychological grounds, that certain patients in order to forget their precarious physical state seek excitation to gratify their illusions of power. Hyperaffectivity also manifests itself by sentimental adventures, often purely platonic, which are a source of trouble to sanatoria. With the erotism of the tuberculous often goes also a certain mysticism. Works of the intellect, such as those of Laennec and Bichat, show no perceptible difference from those of non-tuberculous authors. Concerning works of art and music, there is room for discussion. Certainly tuberculosis does not create talent or genius but only puts its imprint on the work. One does find commonly a certain sadness or *Weltschmerz*, and an exalted sensitiveness to infinitely delicate shades of perception. Examples are seen in the *Journal* of Marie Bashkirtseff, the letters of Mlle. de Lespinasse and the compositions of Chopin or Schubert, also the works of Watteau. The last is a perfect example of the reaction of tuberculosis on the mental state and work. Son of a tailor, he rose by persistent work. May we not attribute to the disease which threatened him before his prime one reason for that artistic fineness entirely different from his origin? All of these tendencies are best revealed in his masterpiece *l'Embarquement pour Cythère.* About this there is a transient charm and immaterial sweetness interwoven.—*Psychologie et Troubles Mentaux des Tuberculeux, E. De Craeme, Rev. Belge de la Tuberc., January, 1925, no. 1, 1.* —(*A. P.*)

Significance of Onset with Hemoptysis in Pulmonary Tuberculosis.—Those whose work lies in the field of diseases of the chest are often struck by the frequency with which pulmonary tuberculosis is ushered in by hemoptysis as the first symptom. This often occurs in patients who, up to the time of their hemorrhage, were apparently in perfect health. We are taught to regard and treat all such cases, when no other cause can be found for the bleeding, as tuberculous until proved otherwise. The figures given show the wisdom of such teaching. In the group of cases with which this study deals the diagnosis of tuberculosis had already been made by at least one physician. These cases are, therefore, not so apt to include the many patients seen in a general hospital, who enter because of hemoptysis, and in whom nothing definite can ever be made out as to the cause of the bleeding. The best practice is that any person having an unaccountable hemoptysis of a dram or more should be carefully studied for other signs of tuberculosis and should remain under close medical observation for a period of several months at least. *Conclusions:* In a study of 245 patients entering Trudeau Sanatorium between the years 1911 and 1922, and having hemoptysis as the first symptom we find: *1.* Only 10, or 4 per cent, failed to show other evidence of tuberculosis. *2.* One hundred and forty-nine, or 60.81 per cent, had a positive sputum either while in the Sanatorium or prior to entrance. *3.* One hundred and seventy-one, or 69.83 per cent, had definite parenchymatous roentgen ray findings. *4.* In 196, or 80 per cent, persistent râles were heard in the upper portion of the chest. *5.* Ten, or 4.08 per cent, had had at some time pleurisy with effusion, or developed this condition while in the institution. *6.* The prognosis in this type of case is no better or worse than any other mode of onset of the disease.—*Significance of a Hemoptysic Onset in Tuberculosis, F. B. Trudeau, J. Am. M. Ass., June 13, 1925, lxxxiv, 1800.*—(*B. T. McM.*)

Frequency of Sudden Onset in Chronic Pulmonary Tuberculosis.—More recent clinical studies, supplemented by X-ray examination and pathology, have produced a great change in our conception of the evolution of pulmonary tuberculosis. Experience is demonstrating more and more that phthisis, far from beginning insidiously in all cases, generally establishes itself quite frankly. The present study is of 100 cases received at the Laennec Hospital, Paris, seventeen to fifty years of age, 50 men and 50 women, all chronic pulmonary

tuberculosis with positive sputum. They were taken in order as they entered the hospital, and unusually careful histories were taken as to all details bearing upon the past history of the case and onset of the disease. The statistical table of forms of onset shows insidious onsets, 34 per cent; onset with hemoptysis, 6 per cent; acute onset with mild prodromal symptoms, 12 per cent; acute onset without prodromes, or with prodromes not to exceed forty-eight hours in duration, 48 per cent. Chronic pulmonary tuberculosis often begins with a tuberculous pneumonia of slight extent, or of any degree up to a whole lobe. The severity of the subsequent disease depends upon the extent of the initial pneumonia. The onset of this form is sudden, with fever, cough, expectoration and pain in the chest. Physical examination usually reveals dulness or some loss of resonance, bronchial breathing or absence of breath sounds, crepitant râles or friction sounds. X-ray examination shows a localized shadow, more or less extensive and more or less homogeneous, with rapid ulceration of the centre of the focus, at times in a few days. Sputum shows tubercle bacilli very early. One or another of these signs may be lacking, but generally they are quite striking in their entirety. The limitations of auscultation must be borne in mind, according to the localization of the pneumonic process. This pneumonic onset was met characteristically in 25 cases. It is, therefore, quite common and is the form of acute onset encountered the most often. If to this form be added the acute onsets with prodromal symptoms of 48 hours duration or less, the number of cases with acute onset comes to 48 per cent, the highest percentage of all.—*De la fréquence du début brusque de la tuberculose pulmonaire chronique, A. Dudan, Ann. d. Méd., April, 1925, xvii, 363.*—(*W. B. S.*)

So Called Latent Period of Pulmonary Tuberculosis.—Before the initial onset or a relapse of pulmonary tuberculosis the actual latent or asymptomatic period is short, being at most a number of weeks or months. At the latest a tuberculosis must make its appearance within six months, or it must, if examination by a physician has not been made in the interval, reveal itself in the history. In exceptional cases a longer time may be necessary for the development of the disease. Usually, a chain of symptoms, which occur from the beginning of the relapse can be made out.—*Über die sogenannte Latenzzeit bei der Begutachtung der Lungentuberkulose, H. Grau, Ztschr. f. Tuberk., 1924, xl, 176.*—(*H. J. C.*)

Fallacies in Chest Examination.—The extrinsic muscles and subcutaneous fat of the thorax may give rise to a poor percussion note and diminution of breath-sounds, which are not indicative of disease. In some cases these tissues are thicker on one side than on the other, and such assymetry must be excluded before impairment of resonance can be said to exist. Unilateral congenital deficiency of muscle or wasting, secondary to disease of one arm, may also lead to error. In thin or wasted people the intercostal spaces sink during inspiration and fill out partially during expiration, but this is not pathological. Muscle sounds, on auscultation, occur in some subjects, especially during the latter half of inspiration, particularly in cold weather. The sounds are multiple and interrupted, symmetrically placed, and unaltered by cough. As a rule they are coarse and rumbling, and are mistaken for crepitations. Occasionally they are much finer, and resemble granular breathing or possibly fine pleural friction. Scapular creaking is caused by friction between fascial layers or by crepitus in the shoulder joint. Very occasionally it resembles the loud coarse friction of chronic pleurisy; more often it is indistinct and indefinite. Deformities of the chest-wall may affect the physical signs. With scoliosis, the areas of thoracic prominence are somewhat dull to percussion, and the breath-sounds here are generally diminished in intensity. Deficient expansion is noted if the shoulder is dropped as a result of the scoliosis. With kyphosis causing considerable deformity crepitations are often audible over adjacent areas of lung, originating presumably in partial collapse. A rib, particularly one of the upper four, may bifurcate or apparently fail to reach the sternum, causing flattening or actual hollowing of the chest. In auscultation skin or hair crepitus may be confusing; it can be abolished by firmer pressure of the stethoscope, or by moistening or greasing the end of it. Surgical emphysema may cause crackling crepitations, which persist when the patient holds his breath and the pressure of the stethoscope is varied. "Air waves," synchronous with the cardiac pulsations, may be heard at the base of the left lung during a long deep inspiration; occasionally they are heard over the upper-lobe area in front. A systolic murmur heard below the inner or outer ends of the clavicles, generally at the end of inspiration, is due to alteration during respiration of the position of the subclavian arteries. Deficient movement of the diaphragm causes faint breath sounds at the bases, those at the apices being relatively harsh; atelectatic

basal crepitations may occur if the diaphragm is stationary. Immobilization of one leaf of the diaphragm may give rise to signs suggesting pleural effusion, which is ruled out by X-ray examination, the presence of intestinal sounds in the suspected area, or by alteration of percussion note at different examinations. Esophageal sounds, due to swallowing, occur as showers of fine crackles usually after cough. Errors which may occur in radiological examination of the chest include the following: the circle of the first rib may be mistaken for cavity; costal cartilage calcifications may simulate pulmonary calcifications; muscle shadows may be confused with pneumothorax or pulmonary infiltration; breast and nipple shadows may appear like intrapulmonary densities; the scapular shadow may be taken for a band of pleural thickening; abscesses and lipomata of the chest wall may cause a localized unilateral density with prominence of lung detail; calcified cervical lymph nodes may appear to be located in the lung apices; surgical emphysema may cause confusing mottling or dappling.—*Some Fallacies in the Examination of the Normal Chest, G. T. Hebert, Tubercle, May, 1925, vi, 369.—(J. B. A.)*

Frequency Characteristics of Lung Sounds.—The quality of sounds, as interpreted by the ear, depends on two factors: (1) the relative intensities of the various frequency components that make up the whole, and (2) the relative sensitivity of the ear at these frequencies. By the term frequency is meant complete cycles or vibrations per second. The physician usually describes the quality of sounds he hears by adjectives, which either imitate them in spoken syllables or convey the idea of relative intensity and pitch. It is evident that many of these terms are purely relative, and only by experience and mutual agreement can any reasonable degree of uniformity in phraseology be attained. The development of the electric stethoscope, however, has changed the situation greatly. Once the sounds have been converted into the corresponding electrical vibrations, the highly developed technique of analysis in telephony becomes available for critical investigations. By means of the so called electric filter all components of any sound above or below any desired frequency may be eliminated without affecting materially the other components to which it may be desired to listen. Charts of heart murmurs are given. A chart of lung sounds is also printed. In it are shown the analysis for eight cases of râles, one of amphoric breathing and four of bronchial breathing. For râles the most important band is from 120 to 1,000 cycles per second. Coarse râles have a proportionately greater amount of low frequency components, and frequencies above 660 cycles per second are generally of no importance. The frequency range of importance varies considerably with individual cases. Breathing sounds have relatively less low frequency components. The energy of these sounds lies above 240 cycles and below 1,000 cycles per second. Lung sounds as a class have a proportionately smaller amount of low frequency components than heart sounds. The descriptive words "coarse" and "fine," as applied to râles, are usually associated with conspicuous "low" and "high" frequency components.—*Frequency Characteristics of Heart and Lung Sounds, R. C. Cabot and H. F. Dodge, J. Am. M. Ass., June 13, 1925, lxxxiv, 1793.—(B. T. McM.)*

Value of Physical Findings in Diagnosis of Pulmonary Tuberculosis.—Most authors take the stand that diminution or increase of the catarrhal findings in pulmonary tuberculosis indicates improvement or progress of the disease, and that in healed tuberculosis no catarrhal findings obtain. It is believed that there is a wide discrepancy between the anatomical and physical findings in pulmonary tuberculosis. Roentgenological and anatomical findings are fairly unified, but percussion findings are less frequent, while auscultatory findings, even in exact and repeated examinations, are variable. Diffuse catarrh over both pulmonary fields is frequent, persisting only for a few days in tuberculous apical disease, even when the other parts of the lung, as determined by further exact observation, are free from tuberculosis. Even respiratory sounds can vary. When a consumptive becomes free from fever and bacilli, increases in weight, and there is an improvement in all subjective symptoms, it must be concluded that there is improvement or healing in a clinical or anatomic sense without evidence from percussion and auscultatory findings. The auscultatory findings in pulmonary tuberculosis are occasioned by specific tuberculous changes of the lung parenchyma and by nonspecific hypertrophic and atrophic changes of the bronchial mucous membranes. The change in respiration is not alone occasioned by infiltrative changes in the lung tissue, but also by those in the bronchial tract (secretion accumulation and edema of the mucous membranes). Healed pulmonary tuberculosis can reveal a marked catarrh, occasioned by the fibroid changes of the healed tuber-

culous tissues. For the determination of the extent of the tuberculous pulmonary disease the percussion findings, and above all those of the X-ray, are important. The determination of activity should not be influenced too much by the presence of catarrhal changes. A careful history, temperature taking, and general impression are very valuable. The absence of catarrhal findings does not exclude an active pulmonary tuberculosis.—*Uber die Beziehungen des physikalischen Befundes bei Lungentuberkulose zu den spezifisch-tuberkulösen Veränderungen, A. Schneider, Ztschr. f. Tuberk., 1924, xl, 349.*—(*H. J. C.*)

Diagnosis of Tuberculosis in Tropics.—Clinical symptoms characteristic of early pulmonary tuberculosis, such as cough, pain in the side and mild fever, viewed as characteristic in Europe, are also found in liver amebiasis and chronic malaria in tropical countries. The Pirquet reaction was positive in 4 per cent of 14,000 tests, while macroscopic postmortem examinations revealed old tuberculous lesions in 13 per cent of those not dying of tuberculosis. The positive Pirquet does not indicate the presence of an active tuberculosis in the tropics. Chronic malaria can temporarily increase the allergy of the skin, while, on the other hand, it frequently calls forth a positive complement-fixation reaction. Complement fixation has also proved of no value in the diagnosis of activity, and only in miliary tuberculosis and with exudative processes does it possess certain advantages over the cutaneous reaction. The cutaneous reaction was used because the intracutaneous and subcutaneous tuberculin injections resulted in frequent focal reactions in the Javanese.—*Zur Diagnostik der Tuberkulose im tropischen Lande, I. Mitt., M. Heinemann, Zeitschr. f. Tuberk., 1924, xl, 324.*—(*H. J. C.*)

Seasonal Variations in Weight of Tuberculous Patients.—Weight may be increased by deposition of fat and retention of water. The first factor is decidedly favorable; the second may be unfavorable or at least of doubtful value. A high temperature militates against gaining weight, because of the patient's decreased appetite and the loss of water by evaporation. At a moderate temperature the deposition of fat will be maximal, and water retention approaches the maximum. At low temperatures the loss of body heat increases with diminution in the deposition of fat; the effect on water retention approximates zero owing to an accompanying fall in relative humidity. Fat deposition is favored by the transition from an oppressive summer temperature to a lower and pleasant autumn temperature. At the same time there is a high relative humidity which diminishes the loss of fluid through the skin and lungs, and therefore decreases the loss of heat, leaving more calories for fat deposition. With the high relative humidity of autumn the variation of the air temperature, as also the cooling of the body by movement of the air, is at a minimum. The low relative humidity of spring will, on the other hand, be accompanied by a maximum variation in the air temperature, making this the treacherous time of the year. During the transition of summer to autumn or from autumn to the rainy season, the annual maximum weight increase of patients is noted. This results both from increased fat deposition and water retention. In tuberculosis, while the deposition of fat is desirable, an increase in weight through water retention is less so, especially in cases of an exudative nature with a tendency to caseation.—*The Effect of the Seasons on the General Condition and Increase in Weight of the Tuberculous Patient, N. Lunde, Tubercle, April, 1925, vi, 323.*—(*J. B. A.*)

Abdominal Reflex in Tuberculosis.—If a case of active pulmonary tuberculosis sitting with the feet hanging free is pressed with the thumb at a point about 2 to 3 fingers distant below the naval and over the right rectus muscle, until the muscle becomes tense, and then the thumb is suddenly drawn sidewise as though one were playing a string instrument, there results the abdominal protective reflex; the leg is drawn up to the abdomen, the foot drawn dorsalward, the fingers dorsalward, and the fingers are frequently spread. The reflex can also be obtained with a person lying on the back and when the muscles are at rest during sleep, but it is not elicited by an electrical current. The attention of the patient during the test must be distracted. In healthy children under 5 years of age the reflex is present on both sides of the abdomen. In 3000 cases of active pulmonary tuberculosis the reflex was positive in 98 per cent. It is an index of intestinal tuberculosis, which, according to pathological findings, regularly is associated with pulmonary tuberculosis. It originates from the involvement of the lower part of the ileum and, therefore, it occurs first in the right lower quadrant of the abdomen. It occurs as early as a month after the beginning of active pulmonary tuberculosis, and persists during the existence of an active process and for two to six months after its termination. There is no active pulmonary tuberculosis without the abdominal reflex. The reflex is

present in tuberculous peritonitis, being bilateral; in typhoid fever, being weakly dextrolateral; in appendicitis, exudative tuberculous pleurisy, acute ovarian and tubal disease, and a number of other abdominal conditions.—*Der Bauchbeinabwehrreflex, A. Bogdanow, Zeitschr. f. Tuberk., 1924, xl, 329.*—(*H. J. C.*)

Diagnosis and Prognosis of Pulmonary Cavities.—The author investigated a series of cases of about the same status as those that Gräff studied, and from which he drew the conclusion that cavities are of grave significance for the tuberculous individual, a view which could not be concurred in by Lyddin. The diagnosis of a cavity is not only dependent upon the so called classical cavity signs, by means of which only large smooth-walled cavities can be determined, but also upon the character of the râles. Metallic tinkling râles and large vesicular râles over definite, extensive areas are characteristic of cavity formation. Not every cavity is discernible by large vesicular râles, and in many cases the X-ray plate is invaluable. Numerous and tinkling moderately large vesicular râles lead to suspecting small liquefactions. Cavity outlines on the X-ray plate are sharp and circular only in the presence of marked fibrotic changes; annular configuration of the pleura, due to fibrotic changes, can simulate a cavity; and encapsulated pneumothorax is rare. At times a comparison of two roentgen plates, one taken after deep inspiration and the other after deep expiration, will differentiate pleuritic changes from cavities, in that the latter during deep inspiration increase in size from 1 to 1.5 cm. The fate of the patient is determined primarily by the basic pulmonary condition. Cavities in essentially fibrotic processes can be well-borne for decades, while with pneumonic processes they are only sign of a rapid termination, while in the nodular fibrotic intermediate types of cases they tend to make the prognosis less favorable. Practically, the unfavorable prognostic significance of the cavity is admitted, but the serious attitude taken by Gräff is not concurred with. Increasing age has a more favorable influence; a bad prognosis is associated with a late secondary stage, with hematogenous dissemination, and rapid spread over large areas. Special significance is noted for occupation and social condition; the better permanent benefit of the private sanatorium is dependent upon the greater protection to the patient after the termination of treatment. The selection of the cases with cavities in the sanatorium must be more strictly met. The predominantly monolateral severe cases, in which pneumothorax treatment is possible, are considered from a prognostic standpoint to be far more favorable.—*Beiträge zur Diagnose und Prognose der Kaverne und zur Prognose des Schwertuberkulösen, H. Grau, Ztschr. f. Tuberk., 1924, xl, 81.*—(*H. J. C.*)

Diagnosis of Migratory Tuberculous Abscess by Lipiodol.—A case is presented in which physical findings and plain X-ray did not suffice to establish a diagnosis, but when lipiodol was injected it was possible to determine by X-ray in vertical, horizontal and oblique positions the point of eruption of the abscess and the exact extent of its suppuration. The lipiodol is well tolerated, and even exerts a favorable therapeutic action. It is recommended that about 10 cc. of this substance be injected for this purpose.—*Radio-diagnostic lipiodole de l'abces froid migrateur, Sicard and Forestier, Meeting, Soc. Méd. des Hopitaux, February 27, 1925, reported in Presse Méd., March 4, 1925, no. 18, 288.*—(*E. H. K.*)

Diagnostic Pneumothorax.—Pneumothorax is a valuable aid in the diagnosis of thoracic disease, especially pathological conditions of the mediastinum, pleura, lung, ribs and the chest-wall. Brauer first used pneumothorax for diagnosis in 1912. The injection of a few hundred (600) cc. of air into the pleural cavity gives valuable information at times, especially in those obscure chest cases, in which one cannot differentiate between an interlobar empyema and a lung tumor, or when one desires to know the exact anatomical location of the lesion. The complete separation of the lung from the costal pleura speaks for a lung tumor with secondary atelectasis of the lung, while extensive adhesions (failure of the lung to collapse) speaks more for an interlobar empyema with pleural thickening. Thus, it is easily seen that air injected into the pleural cavity gives data as to pleural adhesions and also aids in the differential diagnosis of lung disease. The procedure is comparatively simple and free from untoward effects. Two cases are reported to illustrate the procedure.—*Diagnostic Pneumothorax, H. J. Isaacs, Am. J. Roentgenol., March, 1925, xiii, 250.*—(*J. S. W.*)

Differential Diagnosis of Chronic Pulmonary Lesions.—In chronic pulmonary disease the problem is usually that of differentiating tuberculous from nontuberculous infection. There are certain characteristics of the tuberculous lesion which tend to distinguish it from those of other infec-

tions: *1.* The earlier lesions in adults occur in the area of Chauvet, between the first and third dorsal spines, alongside the vertebral column. This manifests itself in the stereoscopic roentgenogram by an area of infiltration, which seems to follow and surround the vertebral bronchial trunk. This area of infiltration, however, seems to persist long after healing or arrest has occurred, and for this reason is not a wholly reliable diagnostic sign. *2.* A second situation for early lesions of tuberculosis, one nearly as frequent and far more characteristic, is anteriorly, in the second and third interspaces near the periphery of the lung. The roentgenological manifestation is a very limited area of fine infiltration, with a variable degree of diffuse cloudiness. It is sometimes possible to distinguish the cone-shaped conformation of the lung lobule itself. *3.* Tuberculosis frequently manifests a chronic, almost healed lesion in one lung and an acutely active lesion in the other. *4.* Tuberculous pleurisy, either with or without effusion, is practically always associated with an already existing tuberculosis of the lung, frequently at the opposite apex. Hence, one is usually justified in ruling out tuberculosis when the stereoscopic roentgenogram shows no evidence of pulmonary tuberculosis. *5.* Fibrosis and calcification are manifestations of tuberculosis which indicate a pronounced tendency to heal, but in themselves do not justify a roentgen diagnosis of healed tuberculosis. Caseation is always a sign of active tuberculosis. *6.* The early apical lesions may become relatively latent, while the disease progresses in the middle and lower lobes, but a basal tuberculosis, without some early involvement in the apex of one or both lungs, is too rare to be of practical significance. If one does not accept this hypothesis, he must at least admit that a differential diagnosis of the lower lobe cannot often be made roentgenographically. *7.* The common condition in the ordinary incipient case is a thickened pleura, with definite fibrosis of greater or less extent underneath it in the lung tissue proper, and at the lower border of this fibrosis areas of caseation varying in size from a millet-seed to a marble, and, immediately below, scattered tubercles, either isolated or in the form of grape-like clusters. Caseation frequently manifests itself in the roentgenograms by a cloudy area which gradually shades into the normal lung surrounding the lesion. It is usually possible to distinguish between cavity and simple abscess by searching other parts of the lung fields and finding the more characteristic evidence of tuberculosis. Accurate roentgenological diagnosis of lung lesions must be based upon anatomical and pathological knowledge. Abnormal densities are the expression of pathological change. Both the distribution and character of tuberculous densities are significant and quite characteristic. Chronic lung infections due to other microorganisms have not received much attention from pathologists because they do not directly cause death and are usually unrecognized by clinicians. They are of frequent occurrence and may be observed roentgenologically.—*The Differential Diagnosis of Certain Chronic Lung Lesions, F. S. Bissel, Am. J. Roentgenol., February, 1925, xiii, 126.—(B. T. McM.)*

X-Ray in Pulmonary Tuberculosis.— It is not uncommon for the radiological report to indicate changes in the lungs which do not give rise to physical signs. In radiograms the earliest evidence of pulmonary tuberculosis is to be found, not in the apices, but in the outer part of the upper lobe, below the clavicle at the right side, or in an almost similar position on the left side. In children the first involvement may be in the apices of the lower lobes. These densities are faint steamy areas, about the size of a millet-seed. The single-flash film is far superior to a time-exposed film in demonstrating them. The presence of such small areas of disease in the upper part of the lung is usually accompanied by restriction of expansion of the apex, which consequently appears darker than on the unaffected side. The commoner form of fibroid phthisis shows minute areas of fibrosis scattered throughout the greater part of both lungs, with a varying distribution of small opaque masses where caseating nodules are present in groups. There may be some degree of bronchiectasis. The term "active tuberculosis" should be avoided in interpreting X-ray films, but one may speak of "recent" infection of the lung when there are opacities suggesting nodules without evidence of the reactive connective-tissue hyperplasm, that plays so important a part in the mechanism of defense against the invasion, which is described as localized fibrosis or sclerosis of the lung. In reading a film it is well to follow out some systematic scheme. It is possible when screening to satisfy oneself as to whether the root-shadows are fluid or solid, by screening down the diaphragm to an area of 3 × 2 inches and getting the patient to breathe from full inspiration to full expiration. Solid bodies, such as calcified lymph nodes, retain their shape; fibrotic areas show up at full inspiration like the fine branches of a moving tree; caseated areas resemble crow's nests in tree branches; while fluid areas, such as

the large veins, undergo a change of shape which one can only describe as ameboid.—*The Use of X-rays in the Diagnosis of Pulmonary Tuberculosis, J. E. A. Lynham, Tubercle, July, 1925, vi, 473.*—(*B. T. McM.*)

X-Ray and Clinical Study of Pulmonary Lesions.—Diseases of the chest fall into three groups, as follows: those readily diagnosed without the aid of the X-ray, those readily diagnosed by the plate, and those which require careful combined X-ray and clinical study. Apical cloudiness is often called tuberculosis when in reality the patient has upper respiratory tract infection. Bronchiectasis high in the lung is frequently mistaken for pulmonary tuberculosis, as are foreign bodies, pneumonic patches, mycotic infections, amoebic abscess and neoplasms, but with careful, coordinated study by both clinician and radiologist, diagnosis of these conditions may usually be made.—*X-ray and Clinical Study of Some Pulmonary Lesions, M. Kahn and M. F. Sloan, Radiology, March, 1925, iv, 198.*—(*H. S. W.*)

Pathognomonic X-Ray Finding in Early Pulmonary Tuberculosis.—Persons with suspected or early tuberculosis are X-rayed, given tuberculin reaction, and X-rayed at the height of the latter. Signs of peripheral density nearly always appear and the test is pathognomonic.—*A Pathognomonic Radiographic Finding in Early Pulmonary Tuberculosis, I. S. Trostler and R. M. Hayes, Radiology, March, 1925, iv, 196.*—(*H. S. W.*)

X-Ray and Clinical Diagnosis of Pulmonary Tuberculosis.—The rapid plate, taken in less than one-tenth of a second, gives excellent detail by doing away with interference from cardiac pulsation, movements from respiration or other cause, but it does not do away with changes of the mediastinum that occur in either deep inspiration or expiration and cast shadows on the plate. The normal shadows cast by the ribs and mediastinal structures (including the heart) constitute a large percentage of the total area of the chest plate. The heart shadow constitutes 40 to 45 per cent of the total area of the chest plate of a twenty-four-hour child and 27 to 28 per cent of that of an adult. The shadows cast by the ribs singly, and the denser shadows where ribs cross each other, also occupy strikingly large proportions of the field. This is not to say, however, that structures may not show, or even that faint details may show less, against a rib shadow. Lateral and head-to-foot tube shifts alter the cardiac, mediastinal and rib shadows respectively. The shape of the chest and the angle and direction of the ribs in infancy, childhood and adult life are important in radiographic interpretation. The inner or hilum zone may be greatly modified, sometimes permanently, in children by the various diseases of childhood, and these changes are sometimes indistinguishable from the changes set up by tuberculosis. The outer zone is considerably obscured by rib shadows, and the remaining middle zone is freest from shadows and "accordingly offers the most unobstructed field of study." Normal living tissue casts a shadow in proportion to its degree of aeration, as is shown by comparing chest plates of the newborn before breathing has begun and afterward, or shown in plates of massive collapse of the lung, or the compressed lung above a pleural effusion, or by comparing chest plates taken with the lungs in deep inspiration and full expiration. Density of shadow cast by an area of tuberculous infection may be increased by caseation, increasing cellular content, fibrosis, shrinkage and calcification; and the density of the shadows in the neighboring parenchyma which is involved in collateral inflammation may be decreased by absorption of peripheral exudate, resolution, physiological emphysema and pathological emphysema. The disappearance of the perifocal density comes about as a result of better perifocal aeration. But the appearance of "cottony" or "mottled" areas of density does not always justify employment of the term "activity," and this word had better not be used in roentgenographic interpretations. It is much wiser to depend upon serial plates to determine activity or regression of the process. Only close cooperation between clinician and radiologist can utilize the X-ray at the best advantage in study of chest diseases.—*The Relationship of the Radiological Diagnosis of Tuberculosis of the Lungs to the Clinical Diagnosis, J. J. Waring, Radiology, March, 1925, iv, 188.*—(*H. S. W.*)

Method of Perfecting Chest Roentgenograms.—Because of cardiovascular movement, it is difficult to secure perfect detail in roentgenographic films of the lungs. This is true even with exposures of 0.05 second. Rapid exposure reveals pulmonary densities that are not demonstrable by slower exposures; but it does not appear that rapid exposure alone, with present equipment, will meet the needs. A mechanism is described by which exposures may be made at any selected phase of the cardiac cycle. The minimum of cardiac movement and of rate of change of pressure, both ab-

solutely in each vessel and relatively, as between pulmonary and systemic circulation, occurs in late diastole, and this period is, therefore, the best suited for accurate recording of pulmonary densities, normal and pathological. Hand synchronization of exposure with the period immediately preceding the pulse-wave felt at the elbow was used in a study of tuberculosis in children, but certain difficulties arose, and these are enumerated. To secure exposures as desired at any predetermined phase of the cardiac cycle, Weyl devised a circuit, and set up an apparatus by which the roentgen-ray switch can be excited by the pulse-wave or the apical thrust. A roentgen-ray exposure timer was modified to serve as a lag timer to close the roentgen-ray primary at selected intervals after the pulse-wave or apex thrust has compressed the air in the receiving tambour. The mechanism is described in detail. With it systolic and diastolic cardiac outlines are reproducible at will, and pulmonary records can be made when cardiovascular movement is at the minimum.—*Automatic Synchronization of Roentgen Ray Exposures, F. M. McPhedran and C. N. Weyl, Am. J. M. Sc., April, 1925, clxix, 510.—(J. B. A.)*

X-Ray of Lungs with New Type of Tube.—A rapidly hardening tube, useless for other purposes, has been found to give extraordinarily clear pictures in chest plates after it had been regenerated. The plates are the finest ever seen. The tube does not last long and must be regenerated frequently.—*Lungendurchleuchtung mit schnell härtender Röhre, O. Kluge, Deutsche med. Wchnschr., January 23, 1925, li, 155.—(H. S. W.)*

X-Ray of Normal Chest.—This is a short statement of the fundamental points in the interpretation of the radioscopic and radiographic appearances of the normal chest.—*The Normal Chest X-Rayed, C. Riviere, Tubercle, May, 1925, vi, 382.—(J. B. A.)*

Artificial Lighting of Apices in X-Ray Diagnosis of Pulmonary Tuberculosis.—In forced expiration the air is pressed out of the caudal lung fields into the apices, which it distends and lights up roentgenologically. When there is infiltration or contraction of the pulmonary apices the lighting, which should occur after cough, is absent. If the Valsava test is performed, by rapidly inflating the cheeks with closed nose and mouth after a deep inspiration, then the healthy apex in the supraclavicular area fills entirely and takes on a soft sponge-like appearance. The lungs in 15 postmortem cases were pumped up through a cannula in the trachea, and the pathological changes were verified by X-ray. It was found that tuberculous apices inflated less than normally and apical pleurisies, which inhibited inflation of the apices, could not be differentiated after inflation from pulmonary infiltration, while apical cavities, according to their density of encapsulation, either increased or diminished with inflation, and emphysema produced an inflation above normal.—*Über den diagnostichen Wert der künstlichen Spitzenaufblähung bei der Lungentuberkulose, A. Bogdanow and A. Golemanow, Ztschr. f. Tuberk., 1924, xl, 280.—(H. J. C.)*

Clinical Laboratory Technique Applicable to Tuberculosis.—*Cytology of tuberculous exudates:* The fluid should be collected aseptically by puncture, in small flasks or tubes containing either glass beads or several cubic centimetres of 10 per cent sodium citrate solution to prevent coagulation. *1. Pleural exudates:* These should preferably be defibrinated, although if a coagulum forms it may be broken up by shaking. The liquid is gently decanted and centrifugated; the sediment, diluted with a few drops, is then examined microscopically. Specimens may be dried and stained, or examined in the moist state after adding a drop of 1 per cent aqueous methylene blue and a cover-slip. Tuberculous pleurisies are characterized through most of their course by a lymphocytosis; however, during the first three days there is a considerable number of desquamated endothelial cells, and of polymorphonuclear neutrophile leucocytes, which later become pyknotic and disappear, and sometimes a few eosinophiles. Effusions developing in the course of pulmonary tuberculosis are apt to be less fibrinous and with fewer cellular elements; as progress toward cure occurs the lymphocytes become more prominent. Purulent pleurisies occurring in the tuberculous generally show a predominance of polymorphonuclear leucocytes; in longstanding purulent exudates these tend to degenerate. In forms following spontaneous pyopneumothorax secondary microörganisms are fairly common. The pleurisies complicating artificial pneumothorax rarely show an exclusive lymphocytosis; when the fluid is turbid polymorphonuclears are generally fairly numerous but do not necessarily mean secondary infection. Old pneumothorax exudates are very apt to undergo purulent transformation. The effusions in cardiac and renal disease are not true exudates but the result of pleural edema. They are characterized by masses

of endothelial cells, which later become hydropic, and may be replaced by lymphocytes. In the effusions following subpleural infarcts or bronchopneumonia, polymorphonuclears, macrophages and red cells are generally present. Effusions complicating specific infections (rheumatism, syphilis, typhoid fever) show at first a predominance of endothelial cells and macrophages; later a lymphocytosis appears. Metapneumonic or parapneumonic pleurisies show during the first three days few cells; from the fourth to the tenth days, predominance of polymorphonuclear neutrophiles; later, increasing lymphocytosis. Cancerous pleurisies generally give rise to hemorrhagic or serohemorrhagic exudates, with many cellular elements often of bizarre appearance, especially of the nuclei. The liquid has hemolytic properties, which differentiate it from that of certain septic and tuberculous exudates containing red cells. Typhoid pleuritic exudates may be hemorrhagic, but show a preponderance of leucocytes or lymphocytes. Certain aseptic purulent fluids contain many polymorphonuclears. Preponderant lymphocytosis generally speaks in favor of tuberculosis as the causal factor. *2. Peritoneal exudates:* Tuberculous serous peritonitis practically always exhibits a marked lymphocytosis with absence of endothelial cell masses. *3. Pericardial exudates:* Tuberculous pericarditis shows lymphocytes and often, also, a considerable number of polymorphonuclears. *4. Articular exudates:* Lymphocytosis here is not pathognomonic of tuberculosis, as it is also seen in chronic nontuberculous forms. *5. Cerebrospinal fluid:* Lumbar puncture is to be done under strictly aseptic precautions and the patient kept in bed for twenty-four hours afterward; about 10 cc. is usually removed. For counting the cells the *cellule de Nageotte* is recommended. This contains 50 cmm., and the field is divided into 40 squares. About 0.5 to 1 cc. of fluid is mixed in a tube, with a small drop of Unna's stain or methylene blue from a pipette. The fluid is then sucked up in the pipette and the cellule filled, covered with a cover-slip and examined. Normally there should not be over 2 lymphocytes per cmm. When there are traces of blood the leucocytes from the blood can be disregarded, but if there is any appreciable amount they must be estimated, and deducted, allowing 1 leucocyte for 900 red cells. In tuberculous meningitis the spinal fluid is clear or slightly clouded, occasionally xanthochromic. It often shows a small fibrillar reticulum or little white floccules or web. The cells commonly number over 500 per cmm., and are predominantly lymphocytes, except at the beginning and end, when polymorphonuclears may be numerous. It must be recalled that lymphocytes may also accompany other forms of meningitis, as in measles, mumps, and syphilis. Epidemic encephalitis causes little cytological change.—*Revue critique des techniques expérimentales et cliniques applicables à la tuberculose, A. Bergeron and R. Letulle, Rev. d. l. Tuberc., March, 1925, vi, 216.*—*(A. P.)*

Serological Diagnosis of Active Tuberculosis.—The urochromogen reaction, as well as the protein content and the relation of globulin to albumin in the serum, proved unserviceable for the diagnosis and prognosis of tuberculosis. In active tuberculosis the leucocyte count does not deviate from normal, lymphopenia is not constant, and a shift of the leucocyte picture according to Arneth to the left favors activity. Persistent lymphopenia and marked shifting to the left of the neutrophilic picture, with absence of eosinophiles, is unfavorable prognostically. Accelerated sedimentation rate of the erythrocytes is not specific for tuberculosis. A normal sedimentation rate does not exclude active tuberculosis. Complement-fixation tests with Wassermann's tuberculosis antigen showed agreement between the serological and clinical findings in only 60 per cent of the cases.—*Zur Diagnostik der aktiven Tuberkulose mit besonderer Berücksichtigung der Wassermannschen Serumreaktion, H. Kalcher and A. Sonnenfeld, Ztschr. f. Tuberk., 1924, xl, 420.*—*(H. J. C.)*

Complement Fixation in Tuberculosis.—The difficulties and differences of opinion in the diagnosis of tuberculosis upon clinical examinations of pulmonary cases, and especially conditions consequent upon gassing or the pandemic influenza of 1918, in which the roentgen rays reveal pathological changes similar to those found in certain forms of pulmonary tuberculosis, are well known and can be readily understood. Hence, any practical and reliable aid to specific diagnosis by laboratory methods would be of much value. Results of the examination of the sputum for tubercle bacilli and of the blood serum by the tuberculosis complement-fixation reaction, to determine the presence or absence of pulmonary tuberculosis, its activity or arrest in 6000 ex-service men are given. For complement-fixation Besredka's antigen was employed in full strength. Each serum, after inactivation, was incubated in 0.2-cc. amounts with varying amounts of complement for one hour in the water-bath at 37°C., after being allowed to stand for one hour at

room temperature. The hemolytic system employed contained an excess (eight units) of amboceptor. Fixations were recorded as negative, borderline (*B.L.*) weakly positive, positive and strongly positive. In 5,997 cases with a negative Wassermann reaction, 1,858 gave a positive tuberculosis complement fixation, 540 a borderline fixation, and 3,599 no fixation. In this Wassermann-negative group only 704 showed tubercle bacilli in the sputum, either at the time of or previous to the test. Of the remaining cases, 271 reacted to both the tuberculosis and Wassermann antigens, and 254 were either tuberculosis-negative or borderline and at the same time Wassermann-positive. Tubercle bacilli were found in the sputum of 12.9 per cent of the former group and in only 0.4 per cent of the latter. Of the 6,522 cases as a whole, 8 per cent gave a positive Wassermann reaction. The percentage of positive findings, when tubercle bacilli were present in the sputum at the time of the test, was 84.5 per cent; that of doubtful reactions, 6.1 per cent; and of negative, 9.4 per cent. It is not possible to state how long the reaction remains positive after arrest of active disease. Besredka estimates that the persistence may be up to six months. That a positive Wassermann reaction is not due to tubercle infection has been amply confirmed, but it is also believed that a nonspecific positive tuberculosis complement fixation is not infrequently found when the Wassermann reaction is positive, and when Besredka's antigen, which includes the culture media, is employed. As to the value of the tuberculosis complement-fixation test, when a positive finding is recorded, a very full investigation should be made before ruling out an infection of tuberculosis. The margin of error of negative findings in bacteriologically positive cases is just under 10 per cent on one examination of the blood, probably less on repeated examinations. As in other serological reactions one cannot expect more of it than a valuable link in the chain of evidence. When Besredka's antigen is used a Wassermann reaction should also be carried out.—*A Study of the Tubercle Complement-Fixation Reaction with Besredka's Antigen in the Investigation of Pulmonary Diseases, W. Broughton-Alcock, M. Douglas and H. C. Lucey, Lancet, June 29, 1925, ccviii, 1331.*—(*J. S. W.*)

Complement Fixation in Tuberculosis.—The authors tested Wassermann's tetralin-extracted and lecithin-treated tubercle bacilli, as well as suspensions of human tubercle bacilli, Rabinowitsch's butter bacillus, bacilli cultivated on Besredka's egg-yolk medium, and suspensions extracted with acetone, ethyl alcohol and chloroform, and a butter bacillus treated with antiformin with and without the addition of lecithin. The tetralin antigen showed no advantages over the other antigens. The addition of lecithin increased antigenic value at the expense of specificity. The complement-fixation methods give negative results in such a high percentage of definitely tuberculous individuals that it cannot even be considered as a diagnostic aid, and especially in the initial stages of the disease. A positive reaction is also to be interpreted with great caution diagnostically or prognostically, on account of the occurrence of positive reactions in nontuberculous individuals, especially syphilitics. A differentiation of active from inactive cases did not seem justified.—*Über die Brauchbarkeit der Komplementbindung mit verschiedenen Antigenen für die Diagnostik der Tuberkulose, H. Schlossberger, O. Hartoch, M. Lusena and R. Prigge, Centralbl. f. Bakt., Abt. I., Orig., 1924, xciii, 59.*—(*H. J. C.*)

Complement Fixation in Tuberculosis.—While the diagnosis of tuberculosis cannot be based solely on this reaction, it may add interesting information. The figures of Léon Bernard, Salomon and Valtin show that in 88 per cent of proved cases of open tuberculosis the reaction was positive, and generally strongly positive; in 83 per cent of cases diagnosed by clinical and radiographic findings, but with negative sputum, it was definitely positive. In subjects with no signs of tuberculosis it was positive in 11 per cent. It was negative in several doubtful cases in which a definite diagnosis of tuberculosis could not be established. Rieux reports the result of 200 reactions as indicating that strongly positive reactions implied the diagnosis of tuberculosis. Of 33 cases of strongly positive reactions he found 15 cases of proved tuberculosis, while of the whole group he obtained 34.5 per cent positive. Of the 25 certain tuberculous subjects 84 per cent were positive. Rubinstein thinks that to interpret feebly positive reactions it would be well to proceed, as in syphilis, to a comparative study of several reactions.—*Valeur de la réaction de fixation du complément dans la tuberculose, L. Bernard, Salomon and Valtin, Meeting, Section d'Études Scientifiques de l'Oeuvre de la Tuberculose, March 14, 1925, reported in Presse Méd., April 1, 1925, no. 26, 426.*—(*E. H. K.*)

Complement Fixation in Tuberculosis.—The complement-fixation test brought out by Wassermann has been used extensively on sera from people with tubercu-

losis, especially skin, surgical and lung tuberculosis. The results have not been at all satisfactory and the test has but little to commend it, as it is now carried out.—*Ueber die Wassermannsche Komplementbindungsreaktion auf aktive Tuberkulose, mit besonderer Berücksichtigung der Hauttuberkulosen, H. Förtig, Deutsche med. Wchnschr., November 14, 1924, li, 1570.*—(*H. S. W.*)

Complement Fixation in Tuberculosis.—The Wassermann complement-fixation test for tuberculosis has been simplified and in general improved. Tetralin-extracted bacilli are rubbed continuously in salt solution that is added drop by drop until a paste is made, and to this is added a lecithin preparation, and the mixture kept on ice for twenty-four hours. It is then centrifugated, the supernatant fluid removed, and the sediment carefully dried *in vacuo* and pulverized. This constitutes the antigen. Several advantages follow the use of this preparation.—*Eine technische Weiterentwicklung der v. Wassermannschen Serumreaktion auf Tuberkulose, H. Reiter and H. Köster, Deutsche med. Wchnschr., May 22, 1925, li, 851.*—(*H. S. W.*)

Complement Fixation in Tuberculosis.—Wassermann's complement fixation in tuberculosis, in which he uses tetralin as an extractive and lecithin, is good, but is subject to wide variations with temperature changes, becoming weakened with lowering of the temperature and becoming negative altogether when the temperature is that of freezing. There is no parallelism between the Wassermann reaction in tuberculosis and the lecithin-calcium-chloride flaking reaction of Sachs-Klopstock.—*Zur Frage der serologischen Blutveränderungen bei Tuberkulose, W. Dölter, Deutsche med. Wchnschr., March 13, 1925, li, 431.*—(*H. S. W.*)

Complement Fixation with Antigens from Nonpathogenic Acid-Fast Bacillis—The Wassermann complement-fixation reaction for tuberculosis is in need of further examination before we can know the nature of the reaction or its value. This question has been approached by using an antigen prepared from nonpathogenic acid-fast bacteria instead of from tubercle bacilli. Comparative tests were done with this antigen in the presence of tuberculous serum, luetic serum and normal serum. Smegma, milk, butter, timothy, snake, turtle and other bacilli were used as sources of the antigens. With tubercle-bacillus antigen, when tested against normal serum, there were 2.4 per cent positive results; with nonpathogenic acid-fast bacilli and normal serum the positives were 2.3 per cent. Bacilli defatted with tetraline show uniformly higher numbers of positive results with normal serum than does antigen from other extractives. The addition of lecithin makes the antigen less specific. The antigens from the saprophytic acid-fast bacilli give positive results at times, but the results are not constant.—*Über Beziehungen zwischen Antigen aus Säurefesten Bacterien und dem Serum Tuberkulöser Menschen, H. Reiter and T. Ogawa, Klin. Wchnschr., May 28, 1925, iv, 1057.*—(*H. S. W.*)

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